CLAIMS

1. A system for determining the angular position and distance of a radiating source with respect to a detector, comprising:

a) a radiation detector;

b) a mask spaced in front of said detector, said mask having a plurality of apertures;

c) recording means for recording an image cast onto said detector by radiation passing through said mask;

d) computing means for computing data related to said image;

e) identifying means for identifying a highest single frequency of said image;

f) said computing means including means for computing degree of magnification of said image on said detector as compared to size of said image as it passes through said mask; and

g) determining means for determining angular position of said radiation source with respect to said detector.

2. The system of Claim 1, wherein said mask apertures comprise a transmissivity pattern varying in one dimension.

3. The system of Claim 2, wherein said one dimension comprises a Y-axis.

4. The system of Claim 1, wherein said detector and mask are planar and lie in parallel planes.

5. The system of Claim 4, wherein said mask and detector are spaced apart by a known distance.

6. The system of Claim 1, wherein said determining means includes means for measuring phase of a low frequency of said image to yield coarse position data.

7. The system of Claim 1, wherein said determining means includes means for measuring a variable frequency peak of said image to yield coarse position data.

8. The system of Claim 6, wherein said determining means includes means for determining phases of frequency components as well as pattern shifts.

9. The system of Claim 7, wherein said determining means includes means for determining phases of frequency components as well as pattern shifts.

10. The system of Claim 1, wherein said determining means includes means for magnifying a mask pattern by a desired degree.

11. The system of Claim 10, wherein said determining means further includes means for comparing a detector image to a magnified mask pattern using cross-correlation.

12. The system of Claim 11, wherein said determining means determines pattern shift of said magnified mask pattern.

13. The system of Claim 1, wherein said determining means includes means for determining distance from said radiation source to said detector.

14. A method of determining the angular position and distance of a radiating source with respect to a detector, including the steps of:

a) providing a mask and a detector in parallel planes spaced apart a measured distance;

b) providing said mask with a plurality of apertures;

c) activating a point source of radiation which directs radiation through said apertures of said mask and onto said detector as an image;

d) recording said image;

e) identifying a highest frequency component of said image;

f) computing magnification of said image as compared to a size of said image at said mask;

g) determining phases of frequency components of said image from f_0 to f_n;

h) determining data resulting from pattern shifts of said image;

i) computing angle of incidence of said source with respect to said detector.

15. The method of Claim 14, wherein before said determining phases step, further including the step of using a variable frequency mask to determine variable frequency peak and coarse position.

16. The method of Claim 14, wherein, before said determining phases step, further including the step of determining the phase of a lowest frequency F_0 of said image to yield coarse position.

17. The method of Claim 14, wherein said determining data step includes the steps of:

a) determining total pattern shift of said image as a sum of frequency component phase shifts;

b) determining pattern shift of a magnified image Y_d; and

c) computing actual unmagnified mask pattern shift $Y_m=Y_d/K_m$.

18. The method of Claim 14, before said identifying step, further including the step of computing a Fast Fourier Transform of said image.

19. A method of determining the angular position and distance of a radiating source with respect to a detector, including the steps of:

a) providing a mask and a detector in parallel planes spaced apart a measured distance;

b) providing said mask with a plurality of apertures;

c) activating a point source of radiation which directs radiation through said apertures of said mask and onto said detector as an image;

d) recording said image;

e) identifying a highest frequency component of said image;

f) computing magnification of said image as compared to a size of said image at said mask;

g) magnifying said mask pattern by a magnification factor K_m;

h) comparing detector image to magnified mask pattern using cross-correlation; and

i) determining angle of incidence of said source with respect to said detector.

20. The method of Claim 19, before said identifying step, further including the step of computing a Fast Fourier Transform of said image.

21. The method of Claim 19, wherein said determining angle of incidence step includes the steps of:

a) determining pattern shift of magnified image; and

b) computing actual unmagnified mask pattern shift.

22. The method of Claim 19, wherein said identifying step includes the step of encoding a single frequency component sequentially.